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# TRANSMISSION OF DISEASES.

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## FIRST PAPER.

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### CONSUMPTION.

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The object of this imperfect paper is to bring forward, in a brief manner, some of the general facts connected with consumption, in the hope it may lead to the development of new light upon its origin and its prevention; for the study of the causes, forms and phenomena of phthisis offers one of the gravest questions now impending in the health of our country.

Among all the diseases that desolate our land, consumption reaps the greatest harvest. More terrible in its exactions than the fabled Minotaur, it demands an annual tribute of quite seventy thousand victims. Science, thus far, appears powerless to check its ravages, and statistics seem to indicate that only one out of several thousand cases are restored by the skill of man or the efforts of nature. When we come to investigate the causes that apparently give rise to the disease, and study the problem of natural life, we become aware that this mortality is in excess of the intents of nature, and that the prevention of a great part of it probably lies within the controlling power of man. We may justly arrive at this conclusion, but we are not quite ready with the array of facts to show how the paths of prevention may be easily and safely followed. However, we will to-day assume the argument that consumption may be, to a certain degree, prevented by a wise adoption of location and habitation, by selection in marriage, and by guarded alimentation and training in early life. The admirable paper of Dr. Bowditch, the revelations of the last census and the observations of a great number of pathologists, leave no doubt but that certain localities, on account of excess of moisture, both in the atmosphere and the land, deficiency of sun-light and prevalence of harsh winds, are cursed by the disease to a far greater extent than others. To these conclusions we will readily acquiesce, for they are also well substantiated and supported by an array of facts concerning other diseases which have a similar origin.

We will now give a brief glance at the laws of inheritance, and attempt to establish a foundation to the theory that by an

observance of the effects of natural law, and by a judicious selection in marriage, we may perhaps lessen the ravages of consumption. At the very commencement of our argument, however, we must admit the statement of the ablest of modern observers, Darwin, that "We know but little, as yet, of the laws of inheritance, for statisticians have not, until recently, paid proper attention to the study." Also, "that the advancement of the welfare of mankind is a most intricate problem." Nevertheless, we will proceed.

The laws and effects of inheritance have not, until recently, been carefully studied, and even now it is the spirit of controversy that directs the search. The natural life of man is so long that the normal period of observation extends beyond the life time of the naturalist. Therefore, to arrive at just conclusions, our statistics should have commenced several hundred years ago. We are, therefore, in consequence, obliged to study the phenomena of life among our wild and domestic animals, whose natural term of life is brief, and from their inherited tendencies and variations, we are justified in deducing a certain degree of reasoning concerning the probable changes in man. We are permitted to do this, for we suffer from the same physical evils as the lower animals, and our systems are governed by similar laws. It has long been well known that certain diseases, like cancer, gout, insanity, consumption, etc., have been inherited, but the laws and variations attending them have not been well understood. Nevertheless, sufficient evidence has been gathered to show that inheritance may be considered a physical cause of disease. Bowditch admits this, and to escape the impending evils he is also of the opinion of Hippocrates, that to change the constitution of the individuals, to prevent the diseases of which they are menaced by inheritance, we must commence in the early stages of life. His views concerning the early training of the young, are highly commendable, and when we come to consider the plasticity of our youth, its tendency to vary, its healthy development under the influence of well-directed care, the faint hope of struggling against seeming fate revives a thousand fold.

If we regard the disease as wholly constitutional, and not produced by any meteorological condition, we may increase our hopes of checking its progress in the manner careful breeders prevent the development and continuance of disease among their choice stock—by prevention, or at least, selection in marriage. It was partly in this manner the ancients produced their typical forms of healthy and perfect men. In discussing some of the almost endless questions to which these ideas of inheritance and selection give rise, the first which presents itself is the inquiry, which parent exerts the most influence on the condition of the child? In reply, the answers are full of perplex-

ity and obscurity, but we are not without hope that time and investigation may eventually give us a better knowledge of the laws and variations of organic life. The transmission of disease from parent to offspring is not to be denied, but it is full of mystery. For it is certain that one parent may transmit to the child of her sex or to her grandchild, a peculiarity which the other parent does not exhibit. Thus, for instance, the father may transmit to his son alone a peculiar form of disease, like gout, and the mother, likewise, may convey another malady to the daughter. It is no less evident that for many forms of disease or derangement of function, we may find the primary cause in one parent alone, or even in both. Double the degree of inheritance, and we increase the severity of the disease in the offspring, and therefore quicken the period of decay.

All organic beings have a period of decay, as well as of development, youth and maturity. This period is vastly modified by the excesses of the parent, as well as affected by the accidents of ordinary life. The startling illustration given by the monk to the celebrated musician, Gretry, on this very idea, is worthy of mention here. In the garden of the monastery the monk planted a few seeds and bade Gretry watch their progress and learn of them the problem of life. Some of the seeds exhibited minute specks, which were invisible to the naked eye, while the others were free from imperfection. They soon sprang up into luxuriant growth, but as the plants commenced to unfold their beautiful flowers, those from the defective seeds suddenly withered and died, while the others passed through all the stages of vegetable perfection. This simple lesson in horticulture was a cruel horoscope to the man of genius, for thirty years after, when at the summit of his renown, he saw his three beautiful children perish of consumption, at the age of sixteen. The early death of his offspring was the result of the violation of the laws of nature by the parent, and the fatal price paid for his fame and the inscription in history.

We may accept the statement as a fact, that one of the parents may impress its offspring more than the other, and may often transmit a distinct disease. Concerning the inheritance of consumption, we are inclined to believe that the mother conveys the disease oftener than the father. Esquirol also maintains that insanity comes more frequently from the maternal side. But whence come the original germs of these disorders, if we regard them as wholly constitutional? And how can we efface them, so as to improve the condition of posterity? These are the important questions to be considered, and they form a most perplexing problem. We may assume that any deviation from a healthy nervous condition is liable to become exaggerated by continued excess or matched with another infirm state. Thus a simple derangement of function may perhaps pass into

a well defined disease, and become established as an inheritance. But we will not at present speculate upon the primary causes and sources of disease, for some of them are quite as mysterious as the origin of life; but we will affirm that once established, they may be propagated to the detriment of our offspring. To give an idea of the extent and influence of the laws of transmission, we will quote briefly from the remarks of three of the ablest naturalists of the present century—Darwin, Flourens and Milne Edwards.

"In considering the law of inheritance," says the illustrious English observer, "two distinct elements are to be considered: the transmission and development of characters. When two species having strongly marked sexual characters are crossed, each transmits them to the offspring. Characters may be transmitted through several generations, and then strangely developed. They may be developed in the same sex, at the same age, and periodically at the same season of the year in which they first appeared in the parents. Variations may be transmitted to one or both sexes, at all ages, and diseases like cancer, consumption and insanity, may appear within well defined periods."

Flourens says: "Variations, modifications acquired by a first generation are transmissible. They not only transmit, but they develop—they increase. We can render them excessive; we can also correct and restrain them. Thus we breed all our large horses and little dogs. We restrain and correct them in contrasting forms, as Buffon says."

Edwards also declares that hereditary influences in the human species manifest themselves in a variety of circumstances; that conformation, faculties, character, infirmities, even, are bequeathed from generation to generation. This naturalist also believes that man may modify many of the physical, moral and intellectual qualities at will, by careful selection. Nevertheless, this modifying power over the plasticity of nature has well marked limits, and we cannot efface the distinctive type of the zoölogical species.

Assuming the statements of the naturalists to be well substantiated, it is evident that in order to lessen the ravages of constitutional phthisis, we must insist that persons of a tuberculous diathesis should not intermarry. There is also evidence which appears to forbid consumptive mothers to suckle their young. We are inclined to believe that the transmission of certain characters are often conveyed to the child during lactation, as well as developed during foetal life. But we cannot assert this as an invariable rule, for it is amply proved that certain characters may be derived from the father, and therefore did not originate during lactation or foetal life.

Concerning the theory of direct contagion of the disease, as

advanced by some of the German and French physiologists, we will only say that in certain cases the appearance of the disease may plausibly be explained in this manner. We will, however, mention some of the late experiments which have proved the inoculability of the disorder, and have therefore strengthened the doctrine of contagiousness.

At the last meeting of the French Association for the Advancement of Science, M. Chaveau demonstrated the transmissibility of tuberculosis by the digestive organs. Numerous observations enabled him to state that if the healthy young of an animal susceptible of tuberculosis were fed with food in which the matter of tubercle was mixed, they would all exhibit tuberculosis in various organs. On feeding calves as described, and slaughtering them on the 60th day after the first ingestion, the lymphatic system was found extensively tuberculized, while caseous deposits existed in the lungs. This theory is supported by an independent series of experiments conducted by Dr. Klebs, in Germany, and recorded in "Archiv fur Exper. Pathologie," 1873. Klebs asserts that the milk of tubercular cows brings on tuberculosis in various animals, and that it commences generally with intestinal catarrh, followed by tuberculization of the mesenteric ganglia, the liver, the spleen, and ending in extensive miliary tuberculosis of the thoracic organs. He is also convinced that a vigorous organism may resist infection by means of milk, and he is quite positive that he has seen full-formed tubercles resorb and disappear through cicatrization. Klebs assumes that the tubercular virus is contained in varying proportion in the milk of cows which are more or less diseased, and the scrofulosis may occur in children born without tubercle, through the milk of an unhealthy mother or wet nurse. He also believes that the virus is contained in the serum of milk in a dissolved state, and that it is not destroyed by boiling.

If we accept these views, it seems proper to forbid the nursing of children by tuberculous mothers. But where shall we draw the line of demarkation between the healthy and unhealthy mothers? The comparative physiologist will select but few, we fear, from the ranks of fashionable society, as proper persons to suckle their young. And why so? The absurdities of fashion in dress and mode of life have modified their constitutions and restrained the full play of their functions. The child, even in foetal life, is affected by the restrictions in dress and the ridiculous conventionalities of fashionable life, and after birth, the infant, with its modified constitution, is exposed to a lactation which is often deficient in quantity and quality, or laden with the germs of disease. Similar views have been entertained by naturalists and writers on nervous disorders.

How shall we nourish these children threatened with these terrible inheritances, if we are obliged to resort to artificial means? It is often very difficult to obtain healthy nurses at the time of need, and the general statistics of artificial alimentation are so fearful that the experimentalist shudders at the idea. But as we especially inquire into the past methods of artificial feeding of infants, we glean a ray of hope from their imperfections.

The ghastly records of foundling hospitals we have nothing to do with, for the frightful mortality of these institutions is quite as much due to the want of the fostering care of the mother, the life giving bond of sympathy of the parent as to the effect of deleterious food, etc. Another important question also presents itself in this inquiry, and it is, What is the natural mortality of infant life of the human species? To what country? To what race or what family can we turn for a correct solution of the problem? Shall we look among the aristocracy, who, with modified constitutions and deficient physical forces, enjoy the benefits of wealth, and the improvements of science? This class of society with impaired fecundity, does not afford a just example, for a prolific and continuous fecundity is the typical characteristic of the vigor of a race or a family. Shall we make our estimates from the rural and laboring class, who, though stronger in blood and the vital humors, and superior in fecundity, are yet more exposed to the vicissitudes of climate, imperfections of habitation and drainage, improper and scanty alimentation, etc? We certainly cannot derive the desired information from the Savage state, where fecundity is limited by nomadic life and want of food, and where the dangers of infancy are increased by prolonged lactation? We will leave this inquiry as it is, since Dr. Jarvis in his admirable paper on infant mortality, does not venture to express his opinion, but we do not believe even the low death rate of Norway, relating to children under one year of age, to be the true and natural ratio. Among all the animals of the earth, where there is a fair chance in the struggle for existence, we do not observe the degree of mortality that checks the expansion of the human race. There is much truth in the melancholy remark of Buffon, "Man perishes at all ages, while animals appear to pass through the period of life with firm and steady pace."

It is a well known fact that the production of milk, like that of any other secretion, is liable to be greatly influenced by even nervous impressions, and that it may be so vitiated and altered in its composition as to produce serious results in the infant. Therefore, when we come to compare the milk of a nurse, enfeebled in constitution, exposed to varied emotions, consequent upon fashion and society, and feeding upon a variety of articles of food of doubtful value, to the milk of a healthy cow,

free from hereditary taint, living a quiet and secluded life, consuming day after day, an abundance of clover and grain, there can be no doubt as to the superiority of the two articles of food. In the one we have a secretion constantly changed by a variety of causes, whose influence cannot be denied—in the latter we have a milk constant in its composition, life-giving in its qualities, and free from the deteriorations which effect the organism of the child.

There is not such a vast difference in the composition of healthy human and cow's milk, as the common nurse experience would have us believe. Their rules of one-third to one-half water in cows milk to assimilate it to human milk is erroneous, and a vast degree of infant mortality may be laid to their systematic methods of starvation. Healthy and selected cow's milk with the addition of a little cooked and strained oatmeal and a spoonful of lime water, we believe to form a safer diet for infantile life than the milk of more than one-half of the mothers of the present day. The great objection to the difficulty of artificially warming the cow's milk to the degree of 95 Fah., is answered by the experimentalists, who have shown that infants can thrive on cold milk, and during the hot season it is probably more beneficial than warm food. One may say that it is unnatural to feed young children in this way, and therefore injurious. But we may reply that only during the period of lactation does nature possess the means of feeding her offspring with warm food, and it is by no means certain that the use of cold milk is an improper method of feeding infants.

Where shall we find the healthy animals to furnish the desired milk, for we have already admitted that cattle may be diseased by tuberculosis, the very infirmity we seek to avoid. We must search for them among the herds whose constitutions have not been modified by ignorance in feeding and neglect in care and breeding. We cannot expect to find them in the large towns and cities, where close stabling and artificial food from distilleries, the waste vegetable matter and refuse garbage of our tables have diseased their systems to their very bones, and caused a high rate of mortality. The use of the milk from these animals is sure death to infantile life. Here we have a serious example of the evil effect of a varied and improper alimentation upon the lower animals. In these instances we may observe that not only the teeth rapidly decay, but that the blood, tissues and even the bones become diseased. The ox when exposed to healthy influences and fed with simple yet nutritious food, is remarkably sound in constitution as compared to other animals, like the sheep, the pig, or even the horse. We see them under the hands of the experimentalist to attain great vigor and exhibit all the characteristics of a healthy species, but

under the influences of neglect, exposure, and a heterogeneous food, their qualities and forms, even, rapidly undergo a change. All deteriorates.

We will not make the statement that artificial feeding is superior or even equal to the means supplied by nature. Nature is always superior to art, but modified nature is another thing, and when we come to hunt for a perfectly formed and healthy woman, we place ourselves very much in the position of the Greek philosopher seeking his ideal man. Among the ranks of society however refined, we may find robust and vigorous forms, affected perhaps with slight nervous peculiarities, or addicted to the follies or pleasantries of fashion, and eating promiscuously whatever falls in their way or is suggested by caprice. Are these persons, even, the proper nurses to suckle children destined to encounter the hardships and dangers of life?

The experimental breeder of animals would emphatically say, No. He would not subject his choice stock to similar risks, and yet how much more important is the life of the child above that of a calf.

In the discussion of this question, we must respect the opinions of these stock breeders, for they have set us some worthy examples, and from their experiences, we may derive information that will lead to a vast improvement in the human race. The development and transmission of variations, the perfection of characters, their continuance or deterioration, the dependence of modifications upon care in selection, judgement in alimentation with a great number of other physical phenomena, have been admirably elucidated by these unsophisticated men.

Science is not only deeply indebted to them, but the facts thus far deduced should become the study of all medical men. In reality the application of these benefits and principles is connected with the theory and practice of medicine. The great English naturalist in support of these views exclaims, "The weak members of societies propagate their kind. No one who has attended to the breeding of domestic animals, will doubt that this must be highly injurious to the race of man. It is surprising how soon a want of care, or care wrongly directed, leads to the degeneration of a domestic race; but excepting in the case of man himself, hardly any one is so ignorant as to allow his worst animals to breed. Man scans with scrupulous care the character and pedigree of his horses, cattle and dogs, before he matches them, but when it comes to his own marriage, he rarely or never takes any such care. He is impelled by nearly the same motives as are the lower animals when left to their own choice; though he is in so far superior to them, that he highly values mental charms and virtues. On the other hand, he is strongly attracted by mere wealth or rank; yet he might by selection, do something not only for the bodily con-

stitution and frame of his offspring, but for their intellectual and moral qualities. Both sexes ought to refrain from marriage, if in any marked degree inferior in body or mind. But such hopes are Utopian and will never be even partially realized, until the laws of inheritance are thoroughly known. All do good service who aid toward this end."

In concluding my paper I will refer briefly to the inquiry, is there any one in these northern latitudes actually free from attacks of the disease? Is there not some latent fault in our systems which certain meteorological influences may affect unfavorably and lead to consumption?

Some of the English hygienists are inclined to believe in the existence of a law of soil moisture relating to this very subject. If our memory serves us rightly, we once heard the celebrated Andral, affirm that all of the people living in certain climates contained the germs of phthisis in the form of minute miliary tubercles, which circumstances might develop at any time. We have often been reminded of this remark by the death of some of the strongest and apparently healthiest athletes from this disease, seemingly induced by blows upon the chest or other accidents. We are also reminded by the experimentalist, that germs of disease may be latent for more than one generation, and suddenly appear as strangely as the rank weeds in the newly cleared field of forest land. Notwithstanding these sinister views, there is sufficient evidence to found the belief that the tendency to the disease may be modified, and perhaps in certain localities be made to disappear altogether, by the adoption of wise hygienic measures.





